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Mr. Mark Baldi
Bureau of Waste Site Cleanup
Massachusetts Department of Environmental Protection
Central Region Office
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Worcester, MA 01608

**Subject: Post-Class C RAO Status Report and Remedial Monitoring Report
No. 2 Fuel Oil Source Area
Former BOC Gases facility
Acton, Massachusetts
RTN #2-11461**

Dear Mr. Baldi:

On behalf of Linde, Inc., AECOM is pleased to submit this Post-Class C Response Action Outcome (RAO) Status Report and Remedial Monitoring Report (RMR) for the above-referenced site in accordance with provisions of 310 CMR 40.0881 of the Massachusetts Contingency Plan (MCP). Light non-aqueous phase liquid (LNAPL) removal continues, as necessary, as part of post-RAO operation and maintenance, and monitoring (OM&M) activities. This report documents, per 310 CMR 40.0898, the OM&M activities performed to maintain the conditions upon which the Class C RAO is based and to achieve further progress toward a Permanent Solution. The period for this Remediation Monitoring Report includes the activities performed between October 1, 2010 and March 31, 2011.

Background

Separate-phase LNAPL was discovered at the BOC facility at 37 Lawsbrook Road, Acton, Massachusetts (see Figure 1) during subsurface investigation activities and was reported to the Massachusetts Department of Environmental Protection (MADEP) on October 25, 1996. Based on the results of a comprehensive site assessment, the area impacted with LNAPL (the source area) is understood to be limited to a portion of the parking lot and wooded area adjacent to the office building (see Figure 2). This release was assigned release tracking number RTN 2-11461 by the MADEP and was classified as a Tier 1C site on October 23, 1997. LNAPL recovery system operations were initiated on May 26, 1999. After completion of the Phase II Comprehensive Site Assessment and Phase III Identification, Evaluation, and Selection of Comprehensive Remedial Action Alternatives, a Class C RAO was submitted to the MADEP on January 31, 2003. The Class C RAO for a

Temporary Solution was submitted because it was apparent that a Permanent Solution was not achievable while LNAPL thickness measurements greater than 0.5 inches were present at the release site. A Phase IV Remedy Implementation Plan, As Built Construction Report, and Inspection Report were submitted to MADEP on February 14, 2003, which detailed the remedial efforts implemented to remove LNAPL from the subsurface.

Continued operation and maintenance of this system and monitoring of wells are performed under Post-Class C Temporary Solution RAO operation and maintenance (O&M) status, pursuant to Section 310 CMR 40.0896 of the MCP. These operation and maintenance activities are performed to maintain the conditions of the Class C RAO and to make further progress towards a Class A RAO. The LNAPL recovery activities follow the O&M plan developed as part of the Phase IV activities; and which are reported to MADEP every six months in accordance with the format outlined in 310 CMR 40.0892.

The party assuming responsibility for conducting the post Class C RAO activities is:

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Status and Frequency of Operation, Maintenance and Monitoring Activities

The LNAPL recovery system consists of six recovery wells, RW-1 through RW-6 (see Figure 2), installed along the central axis of the LNAPL area. LNAPL recovery is accomplished with pneumatic skimmer pumps, which employ a passive (hydrophobic membrane) collection system to entrain LNAPL. The system also has a tank overflow sensor that shuts off the free product recovery system when the recovery tank (drum) is filled. Periodic LNAPL level readings at the six recovery wells dictate the level at which the skimmer pumps are placed. When the system is operating, maintenance of the system and monitoring of the recovery wells takes place at least on a monthly basis. The observations are documented into a field log book.

When groundwater levels were at historic lows during the latter part of 2002 and the early part of 2003, the mobility of LNAPL temporarily increased and LNAPL flowed freely into the recovery wells where it was collected. By May of 2003, the groundwater levels had recovered enough to saturate the LNAPL-containing soils, at which point LNAPL flow into the recovery wells essentially ceased, due to the relative immobility of LNAPL below the water table. The system was shut down on May 2, 2003 for lack of recoverable LNAPL and subsequently has only been operated occasionally as LNAPL is observed in the recovery wells. After LNAPL levels remained too low for LNAPL-recovery via the skimmer pumps for a period of approximately two years, the pumps were removed from the recovery wells to allow subsequent hand-bailing of LNAPL in the wells. The LNAPL skimmer pumps were removed from the recovery wells between April 14, 2004 and February 20, 2009, as LNAPL recovery with each of them became impractical.

Approximately once per month, a set of monitoring wells and recovery wells in and surrounding the source area are measured for water table elevations and LNAPL presence

and thickness. In addition, LNAPL is removed manually from wells where it is observed during gauging.

The LNAPL skimming system remains functional, but did not operate during this reporting period. The thickness of LNAPL did not warrant weekly gauging of LNAPL during this reporting period. Historical operations have shown that operation of the skimmer pump is no more effective than hand bailing when thicknesses of less than six to twelve inches are present. Therefore, hand bailing and LNAPL removal with LNAPL-absorbent socks has been performed in lieu of automated LNAPL removal techniques.

LNAPL Gauging Results

LNAPL thickness data are summarized in Table 1. During this reporting period, monitoring wells MW-17S, MW-40, MW-41, EX-1 and B-38; and recovery wells RW-3 and RW-4 contained measureable LNAPL on one or more occasions. Figure 2 depicts the location of wells that contained LNAPL during this reporting period, and Figure 3 depicts a graph of LNAPL thickness in the recovery wells since system operation began. The LNAPL found in these monitoring wells and recovery wells was removed via hand-bailing or via absorbent sock during this reporting period and placed into appropriate containers on-site. Please note that due to access issues because of weather conditions, recovery well RW-1 was not gauged in January 2011, and recovery well RW-2 was not gauged in January, February or March 2011. Due to recurrent observation of LNAPL in some wells, LNAPL-absorbent socks were placed (and replaced, as necessary) in monitoring well MW-17S, MW-41 and recovery well RW-3.

LNAPL thickness greater than the Upper Concentration Limit (UCL) of 0.5 inches was measured in wells MW-17S, MW-41, EX-1, B-38 and RW-3 during this reporting period. LNAPL was not detected in the wells during the months of January and February 2011. LNAPL was consistently detected in well MW-41 during the months of October, November, December 2010 and March 2011. The water levels have recovered enough since September to saturate the LNAPL-containing soils and reduce the amount of LNAPL flow into the wells, due to the relative immobility of LNAPL below the water table.

Significant Modifications to the System

No significant modifications to the free product recovery system have been made since the last report.

Significant Conditions or Problems and Corrective Measures

No significant conditions arose during this reporting period.

Groundwater Sampling and Analysis Results

In accordance with post-RAO activities outlined in the RAO Statement, a representative set of wells in and around the LNAPL recovery system area were sampled in March 2011 for extractable petroleum hydrocarbons (EPH) and volatile petroleum hydrocarbons (VPH) to monitor potential plume migration or attenuation. The analytical results are summarized in Table 2 and include historical data for comparison. The March 2011 VPH

and EPH fraction data for these locations are presented on Figure 2. The corresponding laboratory reports are included as Appendix A.

Monitoring wells B-38, MW-40 and MW-41 were not sampled due to the presence of LNAPL in the wells during the March 2011 sampling event. The results of groundwater sample analysis are generally similar to previous results with a few exceptions noted below. Groundwater concentrations detected in samples from several monitoring wells in the free product area (i.e., wells B-34, MW-17S, MW-19S, MW-42, MW-43S, MW-44, and MW-45) remain above the MADEP GW-1 standards for some VPH or EPH constituents, primarily C9 to C10 aromatics or naphthalene.

Concentrations of C9-C10 aromatics were detected above the MADEP GW-1 standards in well MW-15S for the first time since the well has been sampled. AECOM will continue to monitor results for this well to determine if it is a transient effect. Hydrocarbons were not detected above the MADEP GW-1 standards in well MW-43D this sampling event. Hydrocarbons were not detected in well MW-4S this sampling event. This is consistent with the understanding that the March 2010 detection of C11 to C22 aromatics was an anomaly that is unrelated to the LNAPL area, which is located approximately 400 feet distant from well MW-4S.

Analytical data meet data quality objectives with one exception. The analytical results for monitoring well MW-42 show that the detected concentrations of C9 to C12 aliphatics and C9 to C10 aromatics are considered estimated results because the relative percent difference (RPD) between primary and duplicate samples exceeded the Quality Control acceptance limit for field duplicates (i.e., 30%). This variation between primary and duplicate samples is believed to be related to the presence of trace amounts of NAPL, a sheen was observed on the purge water during sample collection. However, it does not affect the outcome of the analytical results, given that both C9 to C10 aromatics analytical results are above the GW-1 standard. This duplicate sample result, therefore, is not believed to reflect on the quality of overall sampling procedures.

Presumptive Certainty was achieved for this data set. However, the laboratory narrative indicated a few quality control issues associated with the EPH and VPH analyses. The percent recovery for benzo(b) fluoranthene exceeded the QC acceptance limit in the Laboratory Control Sample (LCS) associated with all samples analyzed for EPH. Sample results are not affected since only non detects were reported for benzo(b)fluoranthene in the samples. In addition, the relative percent differences (RPDs) for both EPH aliphatic hydrocarbon ranges and various individual components for those ranges exceeded the QC acceptance limit in the LCS/LCSD analyses associated with all samples. Results for the EPH aliphatic hydrocarbon ranges in all samples are usable and not significantly impacted by the high RPDs since the individual LCS/LCSD recoveries were within limits.

The percent recovery for n-decane fell below the QC acceptance limit in the VPH LCSD associated with several samples. The RPD for the LCS/LCSD analysis for n-decane also exceeded the QC acceptance limit. Sample results for the C9-C12 aliphatic range are usable and not significantly impacted since only one of the individual components in the range fell outside the QC limits and the recoveries for the aliphatic hydrocarbon range were acceptable.

Remediation Waste Management

No free-product recovery system waste was disposed from the site during this reporting period. To date, since the system has been operating, the total volume of liquid recovered is approximately 3,018 gallons, of which approximately 1,446 gallons has been pure product and 1,572 gallons of product/water emulsion. During this reporting period, approximately 5 gallons of free product and water mixture was recovered by hand bailing and by absorption of the monitoring well skimming socks and placed in a 55-gallon drum.

Status of Class C RAO and Operations, Maintenance, and Monitoring Activities

The conditions upon which the temporary solution for the Class C RAO at the site was based included elimination of potential Substantial Hazards, and operations, maintenance, and monitoring activities to maintain the temporary solution and progress toward a permanent solution. Substantial Hazards did not exist at the time the Class C RAO was achieved. Conditions have only improved since that time, and no change in potential receptors has occurred. Therefore, the conditions of the Class C RAO remain in place. LNAPL removal has resulted in a decline in petroleum contaminant concentrations in groundwater at most monitoring wells and a reduction in the volume and extent of LNAPL has occurred over much of the site, indicating that progress toward a Permanent Solution is being made. Due to the decline in LNAPL thickness, LNAPL recovery rates are low, and therefore, the remedy will rely on natural attenuation processes to make continued progress toward a Permanent Solution. Further assessment of areas that have not yet attenuated will be made as part of the evaluation of progress toward a Permanent Solution leading up to the next five-year Class C RAO re-evaluation in 2013.

Future actions for the next six-month operation, maintenance, and monitoring period will include monthly observations of LNAPL to evaluate the need for LNAPL removal or re-starting the free product recovery system, if sufficient LNAPL recharges into the recovery wells. In addition, recovery wells and nearby monitoring wells will continue to be hand bailed when greater than one half-inch of LNAPL is present. Nearby monitoring wells and recovery wells will continue to have LNAPL-absorbent socks installed and/or replaced as warranted. Dissolved-phase petroleum constituent measurements will also continue to be assessed to track the behavior of the dissolved-phase plume associated with the LNAPL.

Other remediation actions

No new remedial actions have been implemented since the last RAO Status report, which was submitted in October 2010.

Remedial Monitoring Report

The following is a summary of RMR information, required pursuant to 310 CMR 40.0027(2):

- The LNAPL recovery system was inactive during this reporting period, but is ready to be activated should greater than six inches of LNAPL accumulate in one or more recovery wells to allow LNAPL skimming to be performed.


- There were six monthly LNAPL measurement/monitoring events during the reporting period, which took place in October, November and December 2010, and January, February and March 2011.
- Approximately 5 gallons of LNAPL and water mixture was recovered during this reporting period.
- There are no discharges or effluent associated with the system. Accumulated LNAPL and water is disposed as non-hazardous waste under a Uniform Hazardous Waste manifest, as necessary. No such waste was disposed of during this reporting period. Bailed LNAPL and LNAPL-absorbent socks are stored in the LNAPL recovery drums associated with the LNAPL recovery system and will be disposed as drums are filled.
- Groundwater quality data are presented in Table 1 and Figure 2 of this report; and LNAPL thickness data are presented in Figure 3.
- No remedial additives were applied during this reporting period.

Recommendations

AECOM recommends the removal of monitoring wells MW-3S, MW-6S and MW-7S from the semi-annual groundwater monitoring program. The concentrations of VPH and EPH detected in samples from these wells have been below detection limits or below the GW-1 standard since at least 2001. Monitoring wells MW-4S and MW-4D will remain in the groundwater monitoring program as sentry wells, at the downgradient boundary of the site. While concentrations of EPH and VPH in monitoring well MW-4D has been below GW-1 standards since 2001, concentrations of EPH and VPH are more frequently detected in these downgradient wells.

The next RAO Status Report and RMR will be submitted in October 2011. If you have any questions, please contact us at (978) 589-3000.

Sincerely yours,


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Attachments: Figure 1 – Site Location Map
Figure 2 – Dissolved Phase Petroleum Map
Figure 3 – Apparent Product Thickness in Recovery Wells
Table 1 – Summary of LNAPL Gauging Data
Table 2 – Summary of Dissolved Phase Petroleum Hydrocarbon Data
Appendix A – Laboratory Analytical Reports